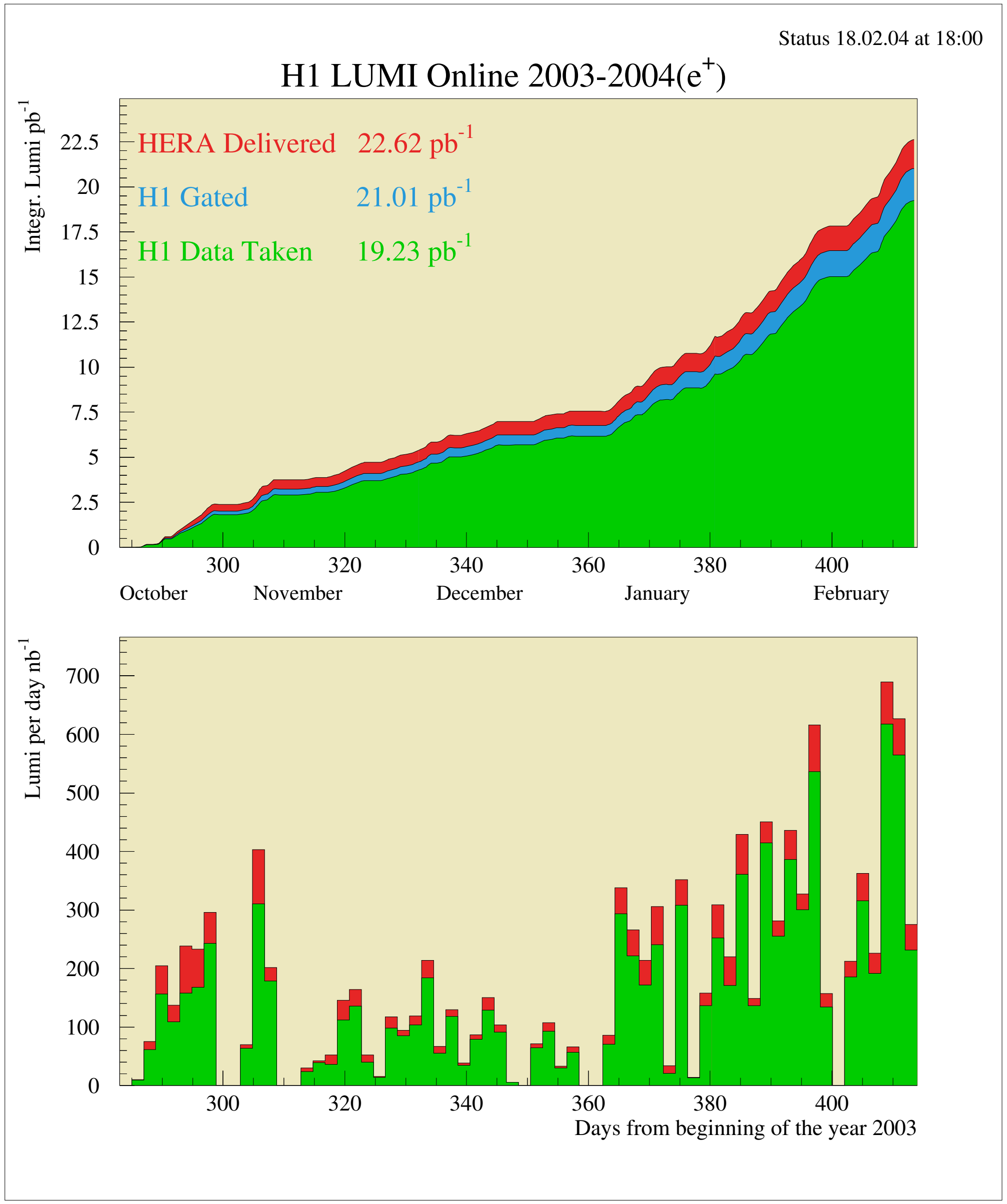
H1 Status

Daniel Pitzl, DESY

HERA coordination meeting, 24.2.2004

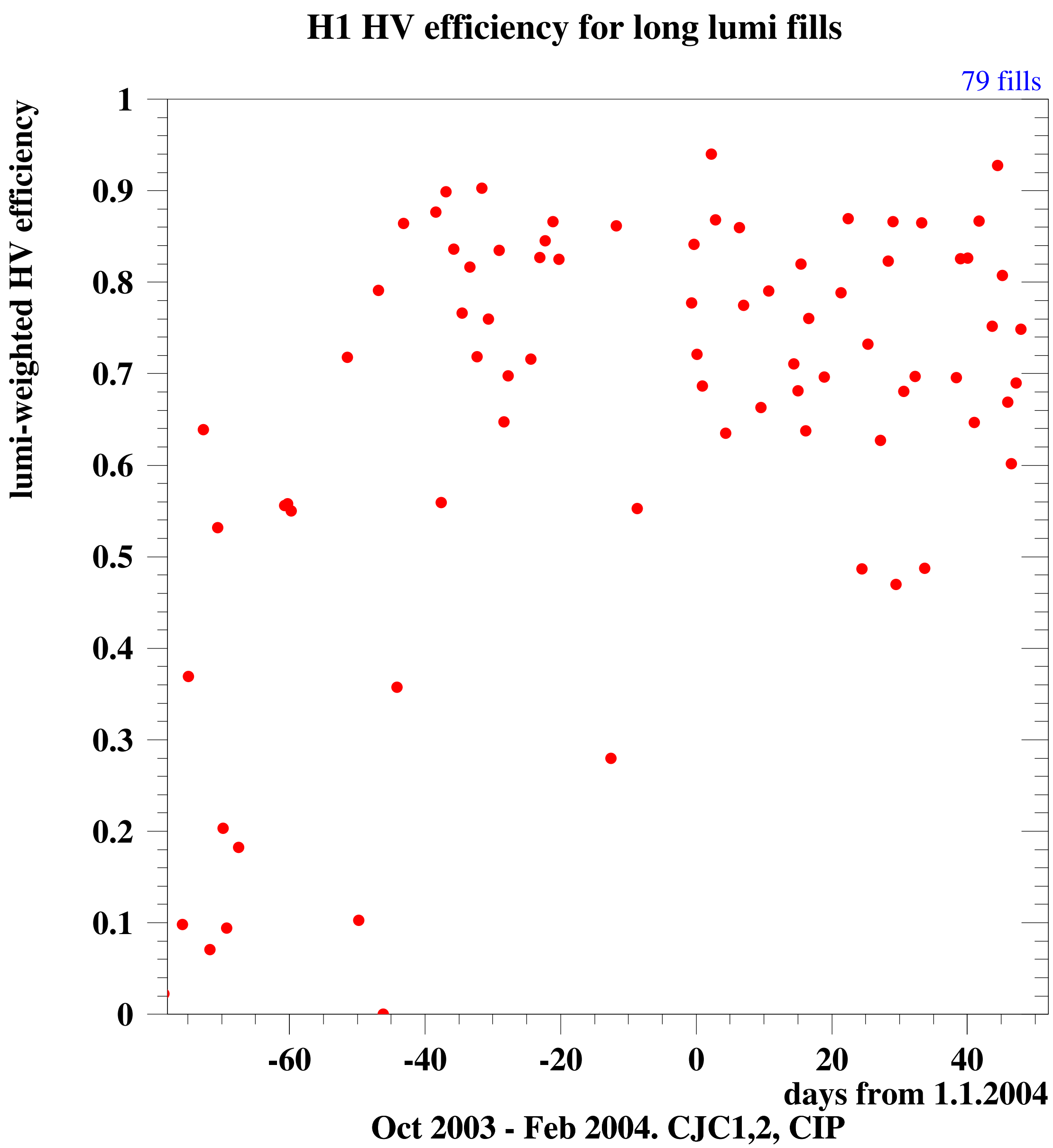
- Luminosity running and data taking
- Backgrounds
- Plans

4 months of luminosity running



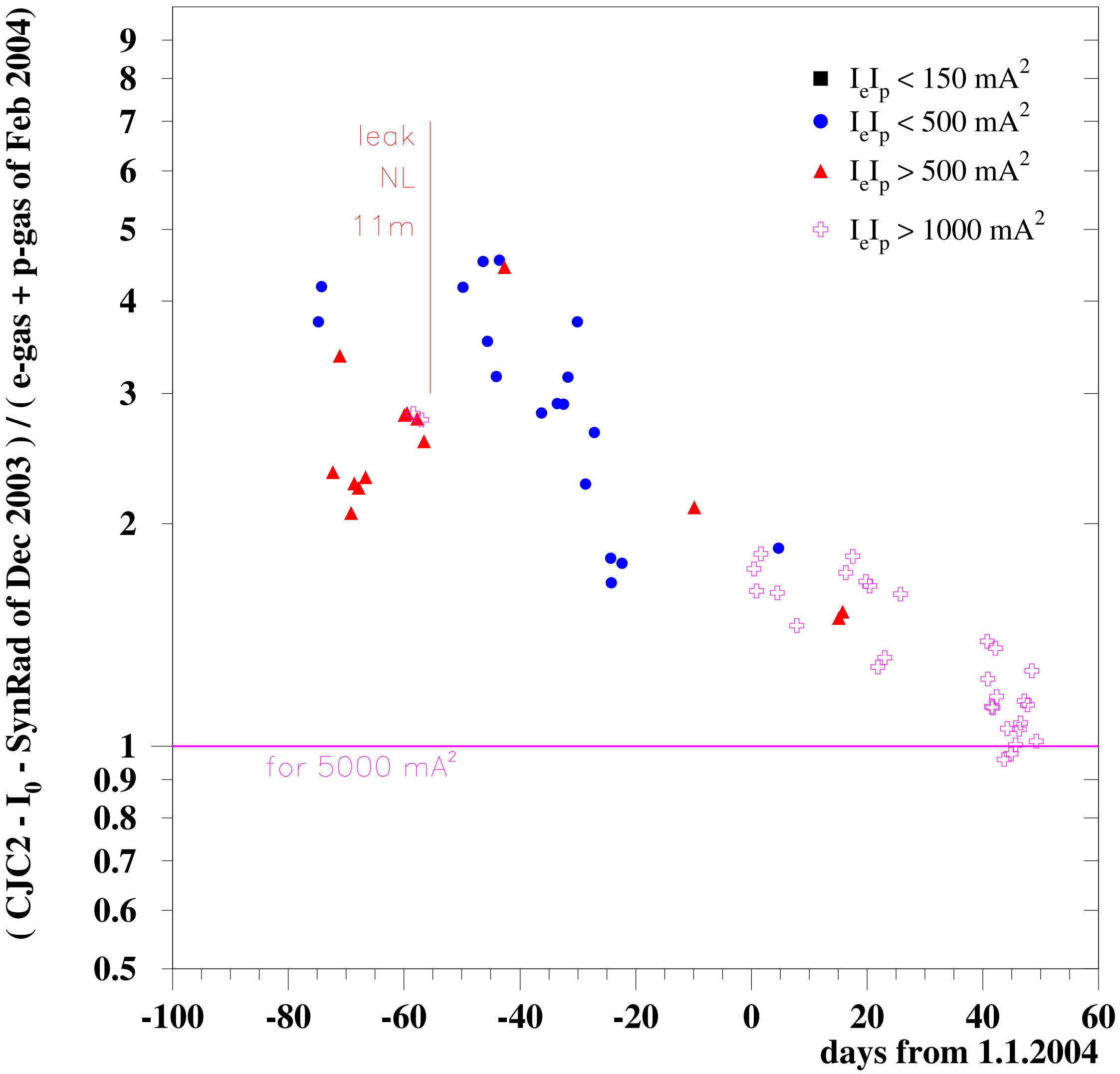
- HERA delivered: $22.6\,\mathrm{pb}^{-1}$.
- H1 DAQ running: $21.0\,\mathrm{pb}^{-1}$.
  93% average DAQ efficiency
- DAQ · (1 - deadtime) $19.2\,\mathrm{pb}^{-1}$.
  8.5% average deadtime
- CJC1,2 and CIP full HV: $12.2\,\mathrm{pb}^{-1}$.
  64% average HV efficiency
- Specific luminosity typically
  starting at $1.3 \cdot 10^{30}\,\mathrm{cm}^2/\mathrm{s}/\mathrm{mA}^2$
  dropping to $1.0 \cdot 10^{30}\,\mathrm{cm}^2/\mathrm{s}/\mathrm{mA}^2$
- Luminosity offline corrections (calibration, acceptance, pile-up) amount to a few percent for 2004.

High voltage efficiency



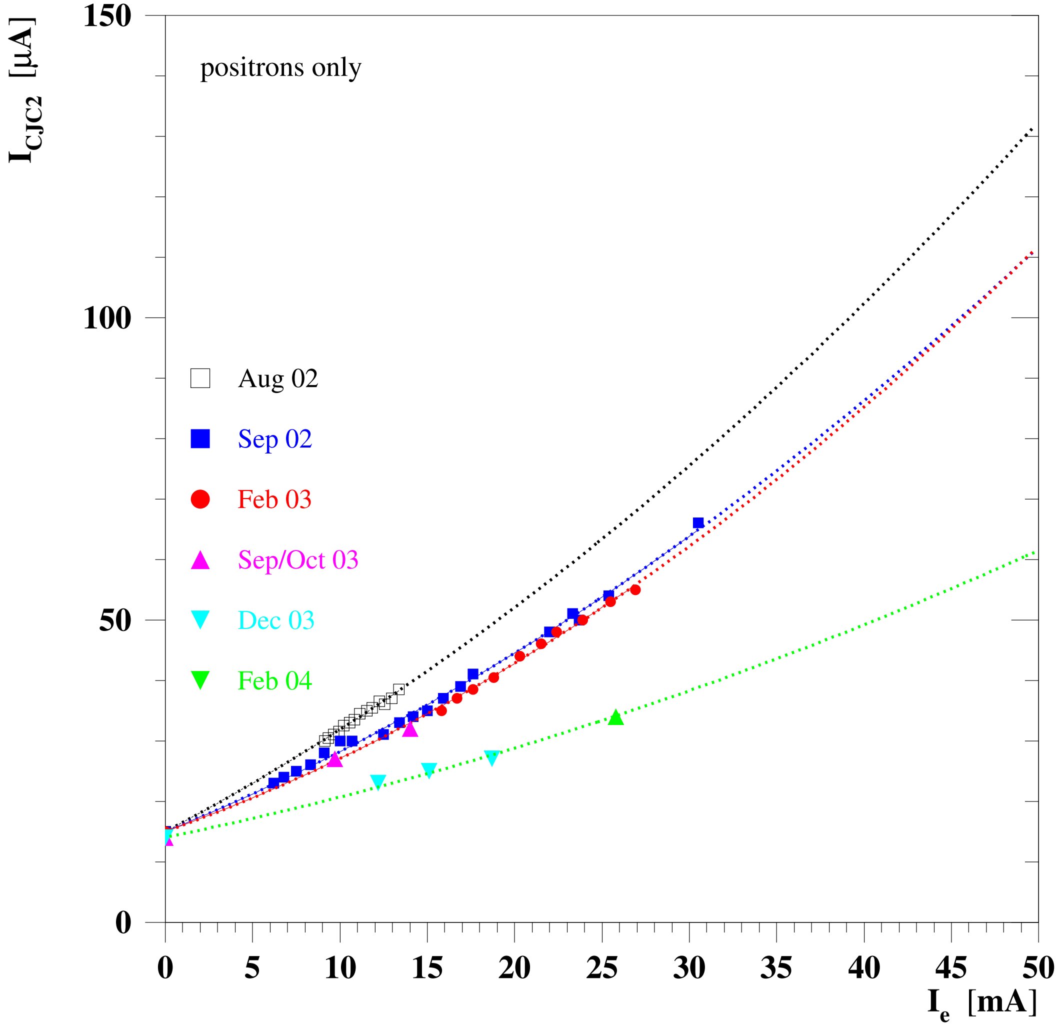
- Upper limit of 90% due to safe but slow sequential HV ramp-up procedure for CJC2, CJC1, CIP.
- Spread from 65 to 90% due to trips from background spikes.
- Points around 50% due to fills with long periods of 'spiky' conditions.
- Most spikes are now caused by drifting beam parameters (e and p tunes).

CJC current history Oct 2003 – Feb 2004



- Long-term improvement by factor ≈ 4 with $\tau \approx 70$ days after vacuum leak on 4.11.2003
- Chamber currents in Feb 2004 allow operation at design beam currents.
- HERA is no longer background limited!
- For the time being, the extra margin was used to increase the CJC gain by 17% for slightly higher hit efficiency and dE/dx resolution.

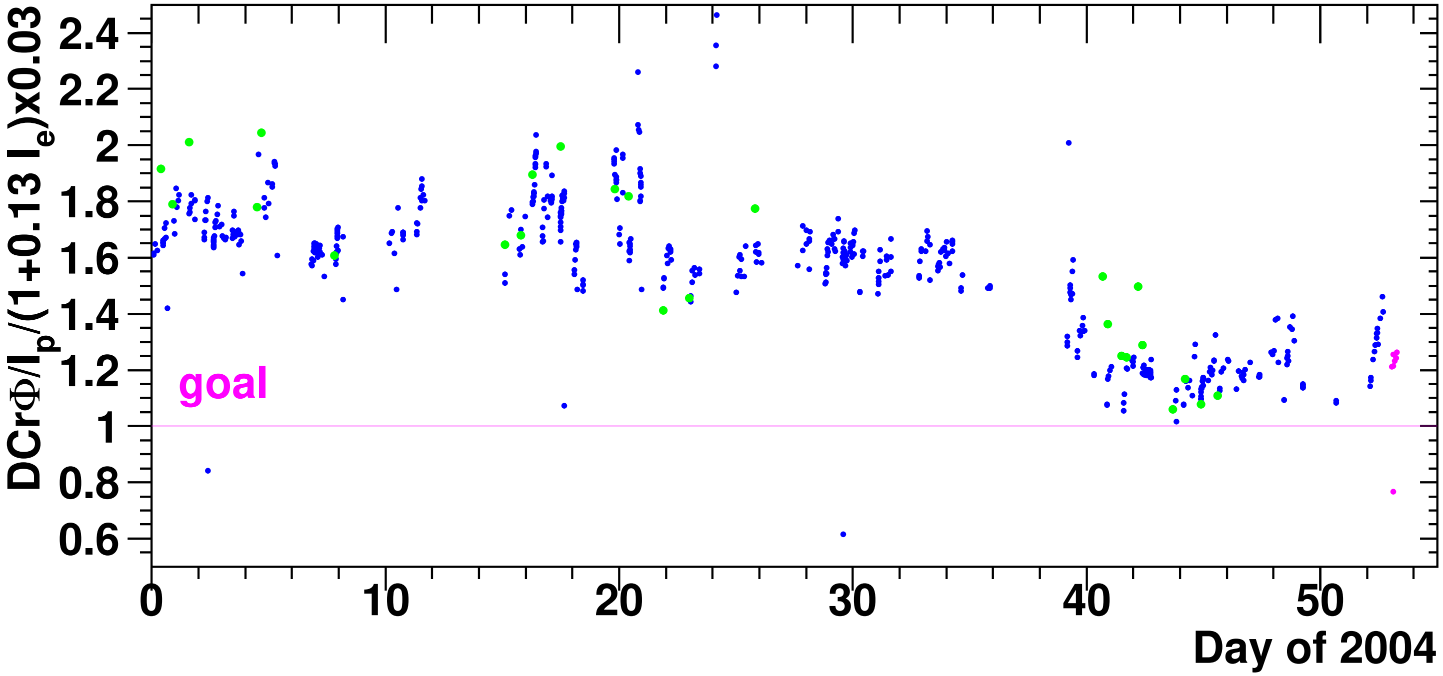
Synchrotron Radiation background reduction



- Synchrotron radiation background in the CJC is now a factor of 2 smaller than in 2002.
- Main effect due to better alignment of H1 beam pipe and better beam steering.
- Lead shielding in backward region also contributes.
- Further reduction factor 1.7 possible by installation of a coated absorber, but requires break of vacuum.

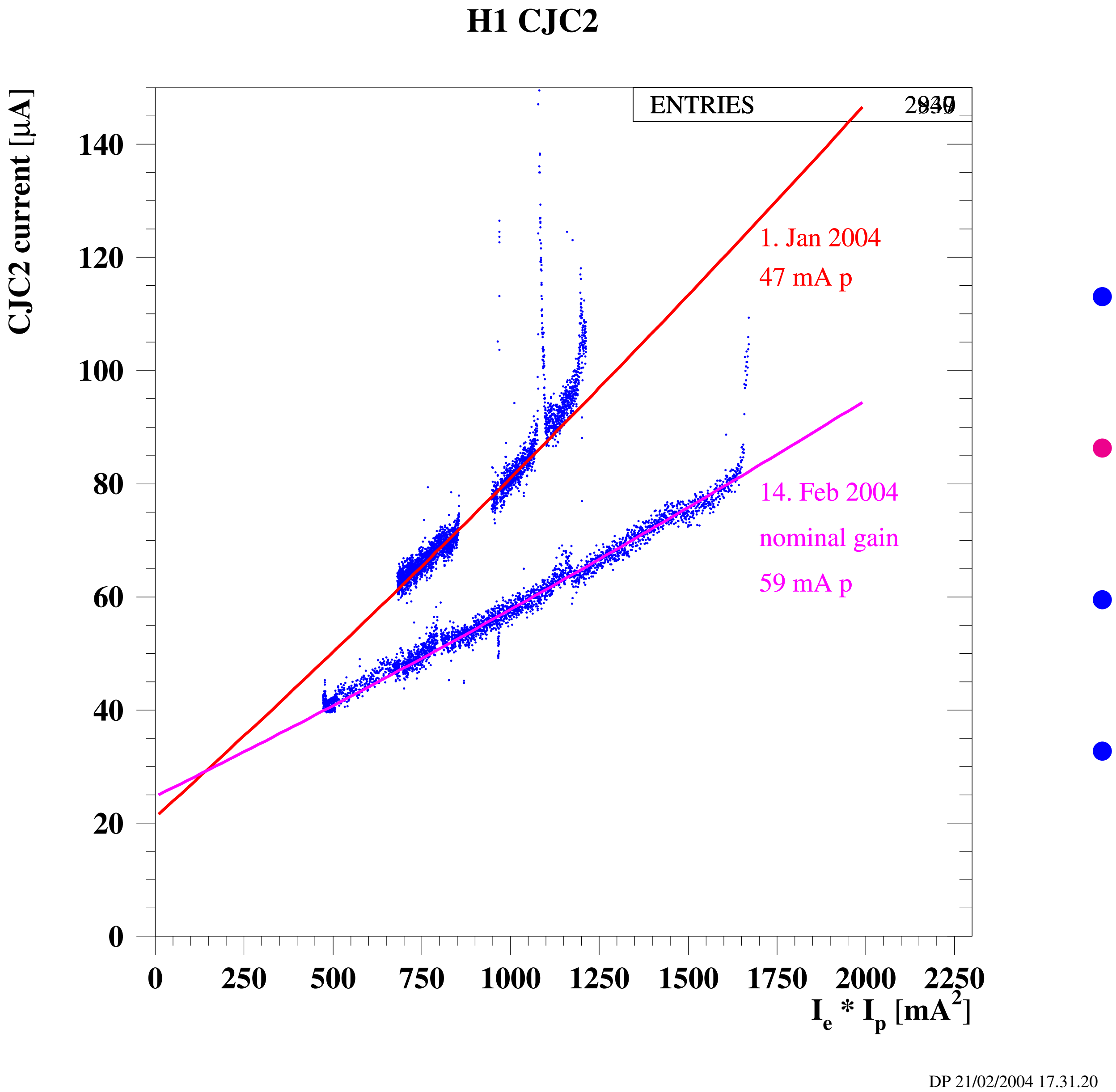
Proton background reduction in 2004

DC-Rϕ trigger rate insensitive to SynRad background, dominated by p-gas background:



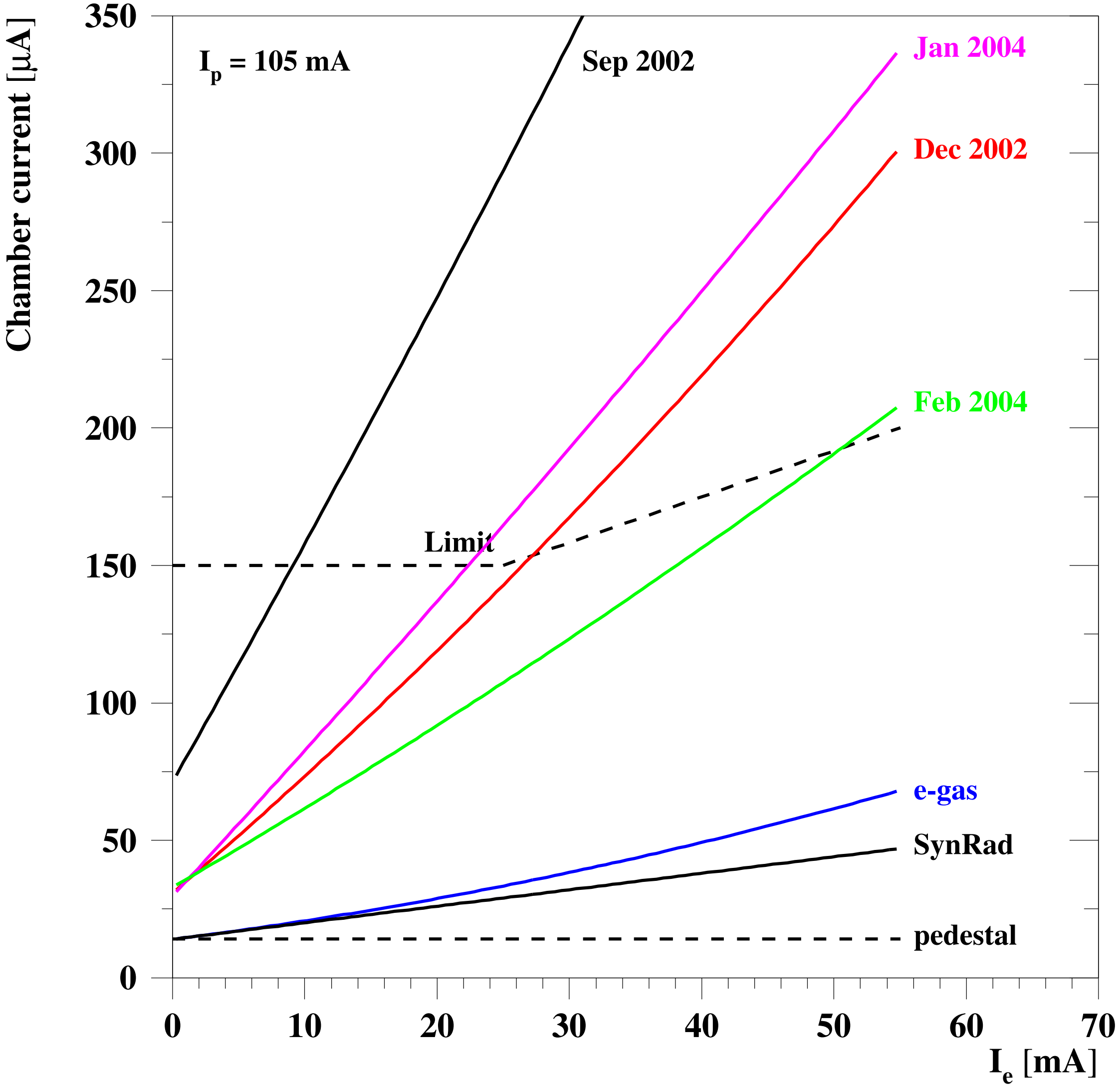
Observe slow trend in January.
Sharp step after NEG pump regeneration around H1 on 5.2.2004.
Procedure should be repeated on 3.3.2004.

Examples: lumi fills 1.1. and 14.2.2004



- Curves use the same e-gas and SynRad coefficients.
- p-gas contribution improved by a factor 2 in this period.
- Parameterization works well out to $I_e = 32\,\mathrm{mA}$.
- 17% CJC gain increase taken out for Feb.

Expected chamber current



- Extrapolating the present conditions by a factor of 3 takes us to 200 μA at $I_e \cdot I_p = 50 \cdot 100\,\mathrm{mA}^2$.
- We always intended to allow higher chamber currents at the highest luminosity, like in 2000.
- p-gas background dominates over SynRad and e-gas.
- Further improvement due to long-term conditioning is not excluded.

Strategy for 2004

- H1 is ready to run with 180 bunches and 90 mA of protons.
- The positron current is expected to increase from 35 mA to 50 mA in small steps.
- The tolerable chamber current at high beam currents will be increased to 200 μA in CJC2 and 240 μA in CJC1.
  The gain increase will probably be undone for safe operation.
  The CJC HV steering has been extended to compensate atmospheric pressure variations, which caused up to $\pm 16\%$ gain variations in the past.
- We propose to switch to left-handed e^+ at the next maintenance day March 4, 2004.
- We encourage further machine studies on the specific luminosity.
- Priorities:
  1. Highest luminosity.
  2. High duty cycle, stable running, collect 100 pb^{-1} until Aug.
  3. High polarization.

Shutdown Summer 2004

- Upgrade of the FPS Roman pots at NL 61, 80, and 90 m.
  Installation of new proton beam pipe sections.
  Coordination with BU repair to be done by ZR.

- Repair of a few EM Spacal cells.

- The Central Silicon detector (1/4 dead) will not be repaired, as it requires a break of the vacuum.

Running in 2004/2005

- After first discussions H1 prefers to continue high intensity e^+p running, aiming for another $250\,\mathrm{pb}^{-1}$ until summer 2005.